

CLAIMS

1. A device for transferring water and heat between a first and a second air flow, comprising a stack of at least two transfer subassemblies having a lamellar configuration, each comprising a transfer structure with hydrophilic porous materials (3, 4) arranged between a first structure for distributing the first air flow (1) and a second structure for distributing the second air flow (2).

2. The device as claimed in claim 1, characterized in that the transfer structure comprises at least one microporous layer (3) and one macroporous layer (4).

3. The device as claimed in claim 2, characterized in that the macroporous layer (4) is a support layer made from a material with long fibers.

4. The device as claimed in claim 3, characterized in that the macroporous layer (4) is made from a material formed of cellulose or glass fibers.

5. The device as claimed in either of claims 3 and 4, characterized in that the macroporous layer (4) consists of woven fibers.

6. The device as claimed in one of claims 3 to 5, characterized in that the macroporous layer (4) has a pore size of between 50 and 250  $\mu\text{m}$ .

7. The device as claimed in one of claims 2 to 6, characterized in that the microporous layer (3) has a pore size not exceeding 5 microns.

8. The device as claimed in claim 7, characterized in that the microporous layer (3) is made

from polyethersulfone (PES).

5       9. The device as claimed in one of claims 2 to 8, characterized in that each of the porous layers (3, 4) is not more than 5 mm thick.

10       10. The device as claimed in one of claims 2 to 9, characterized in that the porous layers of a subassembly are in local contact (9, 10) with the porous layers of an adjacent subassembly.

15       11. The device as claimed in one of the preceding claims, characterized in that each transfer structure (1, 2) comprises at least one molded polycarbonate plate.

20       12. The device as claimed in one of the preceding claims, characterized in that the stack is peripherally enveloped in an airtight film.

25       13. The device as claimed in one of the preceding claims, characterized in that the stack is mounted pressed between fluid distribution bodies (20, 21) provided with members for connection to circuitry.

14. The use of a device as claimed in one of the preceding claims, for humidifying the air feed to a fuel cell.